

Copy No. 8 10  
Sheets

MEMO FOR RECORD

Serial: CPS-502  
February 9, 1961

25X1A

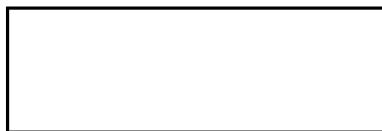
From:

*CGM*

Subject: Summary of System Characteristics

On the following pages a summary of the camera system is given in the form of salient numbers and brief descriptions. The list is by no means complete, and revision will be made periodically. Design changes affecting the summary should be reported to the author who will keep a running file.

CPS/jje



25X1A

Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>	<u>Status</u>	<u>Reference</u>
1 Camera system	Twin camera, convergent stereo, panoramic	Firm	
2 Type of IMC	Twisting image, slightly varying sweep velocity, constant film velocity	Firm	
3 Direction of sweep	Transverse to flight line, +y to -y	Firm	
4 Coverage, across flight line (from operational altitude)	$\pm 30^\circ$ of convergent stereo covering $\pm 8.5$ n. miles, 30 to $63^\circ$ both sides of conventional stereo covering up to 30 n. miles either side of flight line	Firm	
5 Coverage, parallel to flight line (per camera frame)	5.2 n. miles at flight line 11.6 n. miles at $63^\circ$	Firm	
6 Spacing between successive sweeps	0.1 x altitude over $\pm 30^\circ$ , 0.2 x alt. from $30^\circ$ to $63^\circ$	Firm	CPS-303
7 Mounting angle between cameras	$11.4^\circ$	Firm	CPS-303
8 Forward overlap	72% at $0^\circ$ convergent stereo 76% at $30^\circ$ 52% at $30^\circ$ conventional stereo 75% at $63^\circ$ conventional stereo	Firm	CPS-303
9 Ground resolution(feet)	X Y Sweep Angle Estimated		
	1.3 to 1.6 1.3 to 1.5 $0^\circ$ )Convergent		
	1.5 to 1.8 1.7 to 2.1 $30^\circ$ )Stereo		
	1.5 to 2.2 1.7 to 2.8 $30^\circ$ )Conventional		
	2.6 to 3.3 6.3 to 7.7 $63^\circ$ )Stereo		
10 Stereo base/height	.353 ( $30^\circ$ to $-30^\circ$ ) .200 ( $30^\circ$ to $63^\circ$ both sides)	Firm	CPS-303
11 Stereo acuity	1.5 feet near nadir	Estimated	
12 Duration of photography	136 minutes <u>maximum</u> including 5 minutes pre-run 126 minutes run 5 minutes post-run	Firm	

-3-

Serial: CPS-312  
February 9, 1961

## Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>	<u>Status</u>	<u>Reference</u>
13 Range of coverage	3740 n. miles <u>maximum</u> at V/H = .035	Firm	
14 V/H	.035 nominal .029 to .046 max. range .032 to .042 probable range .053 in emergency	Approx. range uncertain	
15 Cycle period	5.714 sec at V/H = .035	Firm	CPS-303
16 Duty cycle	66.5% on, 33.5% off	Firm	CPS-304
17 No. of frames	1428 per camera	Approx.	
18 Frame length	34.23" ± nominal 93° sweep (21"ef) 34.59" ± exposed length .45" to .80" interframe spacing 35.04" to 35.39" total (35.22" average total)	Firm Approx. Approx. Approx. Approx.	CPS-307
19 Film length	4200 feet per camera <u>maximum</u>	Firm	
20 Image width	7.48"	Firm	CPS-303
21 Film width	7.960" ± .010"	Firm	
22 Film thickness	0.0029" ± .0002"	Firm	
23 Roll diameter (4-1/2" core)	14.9" dia. <u>max.</u>	Firm	
24 Film weight	63 lb/camera <u>max.</u> (126 lb. <u>max.</u> total)	Firm	
25 Lens	J241, modified triplet with 9 elements, thermally stabilized	Firm	
26 Focal length	21" ± 1%	Firm	CPS-301
27 Field	±10.1°, 7.48"	Firm	CPS-303
28 F/No.	4	Firm	
29 Filter	Orange, Wratten #21 equivalent	Approx.	
30 Window material size (clear aperture) coating (inside) transmission	Fused silica 22" wide, 23-1/2" long, 1" thick Low emissivity in IR ( $\approx 0.1$ ) 79% average from 550 to 700 $\mu$ u	Firm Firm Tentative Approx.	

Serial: CPS-312  
February 9, 1961

## Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>	<u>Status</u>	<u>Reference</u>
31 Thermal window sandwich			
size	.8" dia.		
material	LBC-2 and filter glass	Approx.	
thickness	.3/8" each, 1.0" total sandwich	Tentative	
coatings	Low emissivity on one inside surface	Tentative	
transmission	79%	Tentative	
32 Sweep mirror			
size	13" long, 10" max. width	Approx.	
material	Aluminum	Tentative	
33 Additional imaging optics	Focusing mirror 3 mirror image twister for IMC	Firm Firm	
34 Optical transmission	26.5% (visible light)	Estimated	
35 T-stop	6.9	Estimated	
36 Emulsion	S0-132	Firm	
37 Lens-film resolution	130 1/mm at 0° 100 1/mm at 5° 65 1/mm at 10°	Estimated	
38 Spectral sensitivity (with filter)	550 to 720 $\mu$ u, pk at 690	Firm	
39 Development	Special	Tentative	CPS-305
40 Speed point	1.1 log meter-candle-sec	Estimated	CPS-305
41 Exposure settings	1/25, 1/50, 1/100 nom., 1/200 sec.	Tentative	
42 Slit widths	.36", .18", .09" nom., .045" width $\pm$ 10%, $\pm$ .025" centering with respect to platen	Tentative Firm	
43 Slit length	7.48"	Firm	CPS-303
44 Capping shutter	At focal plane, closed between cycles and when camera is off	Firm	CPS-306
45 Film velocity			
During sweep	9.0088 in/sec {at V/H .035	Firm	CPS-304
Average	6.132 $\pm$ 1% in/sec } and ef $\pm$ 21"	Firm	CPS-307

-5-

Serial: CPS-312  
February 9, 1961

## Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>	<u>Status</u>	<u>Reference</u>
46 Sweep rate	24.4 to 24.6 °/sec at V/H = .035	Firm	CPS-304
47 Image twist	2.1° to 4.6°	Firm	CPS-304
48 Platen			
Speed	3 revolutions per cycle exactly	Firm	CPS-310
Size	5.4456" ± .001" diameter for 21" of .0002" runout	Firm	
49 V/H signal	Voltage (analog)	Tentative	
50 Control	Autocycle, rate controlled by V/H. Two intervalometers, one per camera, one master and one sub.	Firm	
51 Phase tolerance of sweep	±1°	Firm	CPS-307
52 Phase tolerance between cameras	±1% of cycle	Firm	CPS-307
53 Data recording (edge of each frame)			REG-301
Fixed data	Mission No. Camera No. Date	Firm	
Time	1KC track with omission of 1, 2 and 3 Pulses respectively every .01, .1 and 1 second		
Nadir	Additional pulse between normal 1KC pulses		
Coded data			
Format	Two synchronizing tracks and four data tracks, in parallel along edge of film	Firm	
Code	Binary coded decimal	Tentative	
Data	Roll	Not in prototype	
	Pitch	Not in prototype	
	Ground track	Firm	
	True heading	Firm	
	Longitude	Firm	
	Latitude	Firm	
	Ground speed	Firm	
	Elapsed time	Firm	
	V/H	Tentative	

Serial: CPS-312  
February 9, 1961

## Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>	<u>Status</u>	<u>Reference</u>
	Data record after flight		
	Security classification Code no. or name Frame no.		
54 Autofocus			
Focus tolerance	$\pm .0005"$	Estimated	DJSJ-301
Range			
Grid pitch			
55 Autobalance			
Range	$\pm 45$ in.lb		
Rate of correction	0.05 in.lb/cycle, max.		
Balance tolerance	$\pm 5$ in.lb or .011" cg shift		
56 Vibration isolation			
Residual vibration	Viscous damped isolator		
Natural period	0.15g at 10 cps & 100 cps 7.67 cps		
57 Stabilization			
	Rate stabilization during on cycle Reset to vehicle attitude during off cycle		
			DM 31 Dec. '60
			DM 22 Nov. '60
	Settling period Natural period		
	0.4 sec $P_x \approx 22.4$ sec $P_y \approx 21.7$ sec $P_z \approx 18.6$ sec		
58 Cage limits	$\pm 4^\circ$ rate stabilized $\pm 1/2^\circ$ electrically caged $\pm 5^\circ$ mechanical stops	Firm	DM 31 Dec. '60
59 IMC tolerance	2.52% total for 1/100 sec. exposure	Approx.	CPS-312
60 Tolerance breakdown			
Terrain variations within frame	$\pm 500^\circ$	Approx.	CPS-312
V/H measurement	$\pm 1\%$		
IMC or camera rate	$\pm 0.5\%$		
Sweep rate with respect to film rate	$\pm 0.1\%$		
Sweep mirror vibration ( $>100$ cps)	$\pm 0.2\%$		
Twist angle of 3 min. for prism	$\pm 2$ arc minutes		

Serial: CPS-312  
February 9, 1961

## Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>			<u>Status</u>	<u>Reference</u>
Attitude					
Roll	$\pm 0.9^\circ$				
Pitch	$\pm 1.8^\circ$				
Yaw	$\pm 0.8^\circ$				
Attitude rate	$\pm 0.5$ mr/sec about each axis				
Angular vibration (> 100 cps)	$\pm 0.4\mu$ image motion				
61 Attitude tolerance breakdown	Roll	Pitch	Yaw		
Camera boresight to vehicle	$\pm 0.2^\circ$	$\pm 0.2^\circ$	$\pm 0.2^\circ$		
Platform aero set	$\pm 0.1^\circ$	$\pm 0.1$	$\pm 0.1$		
Vehicle roll	$\pm 0.11^\circ$	$\pm 0.11$	$\pm 0.11$		
Platform roll	$\pm 0.286^\circ$	$\pm 0.286$	$\pm 0.071$		
Maneuvering	$\pm 0.8^\circ$				
Angle of attack		$\pm 1.8$			
Cross winds					
Total (RSS)	$\pm 0.9$	$\pm 1.8$	$\pm 0.78$		
				$\pm 0.8$	
62 Weight				Estimated	
Window & frame	70 lb				DPR-301
Isolator & Stabilizer	80 lb				DM 31 May '60
V/H device	33 lb				
Camera stabilized portion					DPR-301
Separately mounted electronics	71 lb				DPR-301
Misc.	15				DPR-301
Total w/o window					
63 Moment of inertia					
$I_x$	225 lb in sec <sup>2</sup>			Approx.	WM 31 Dec. '60
$I_y$	253				
$I_z$	376				
64 Power				Estimated	RLW-311
On stabilized camera	Avg. 105 watts	Peak 238 watts			
Off stabilized camera	316	506			
Isolator & stabilizer	118	311			
Total	539				
Heaters (not during camera operation)		4000			

-8-

Serial: CPS-312  
February 9, 1961

## Summary of System Characteristics

<u>Item</u>	<u>Characteristic</u>	<u>Status</u>	<u>Reference</u>
65 Atmosphere			
Gas	Helium	Firm	
Pressure	1.5 psia	Approx.	
Temperature			
Oven	476-380°F	Approx.	
Bay	78-115°F	Approx.	
Top batch	78-100°F	Approx.	
66 Test Equipment			
Alignment jigs			
Test collimator			
Test console			
Misc.			